

# A new species of *Phthiracarus* (Acari, Cryptostigmata) from Austria

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## Introduction

A small collection of mites from oak litter in the Vienna Woods, Austria was examined by Sheals in connection with a computer study of phenetic affinity within the Phthiracaroidea (Sheals, 1969). The material was found to contain several specimens of an undescribed phthiracarid mite, the notogastral integument of which was particularly striking and apparently unique amongst the known members of the superfamily. Moreover, although the species showed an overall similarity to *Steganacarus*, its anal chaetotactic pattern corresponded to that of *Phthiracarus*. Classification of the mite was deferred at this time and Sheals excluded it from his study. However, in view of its interesting morphological features a detailed description was considered desirable and is given below, based on the seven available specimens.

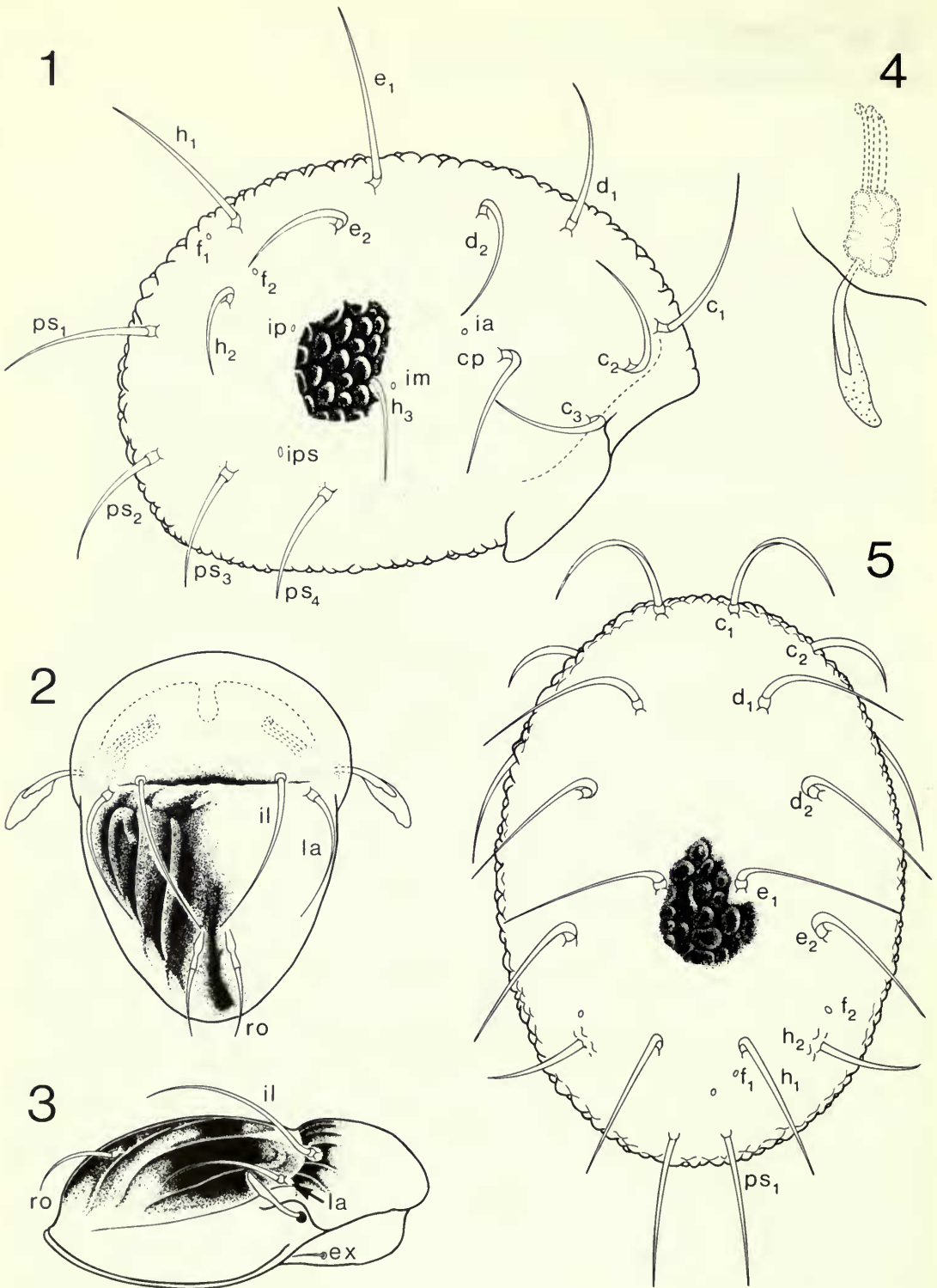
Family PHTHIRACARIDAE Perty, 1841

### *Phthiracarus papillosus* sp. nov.

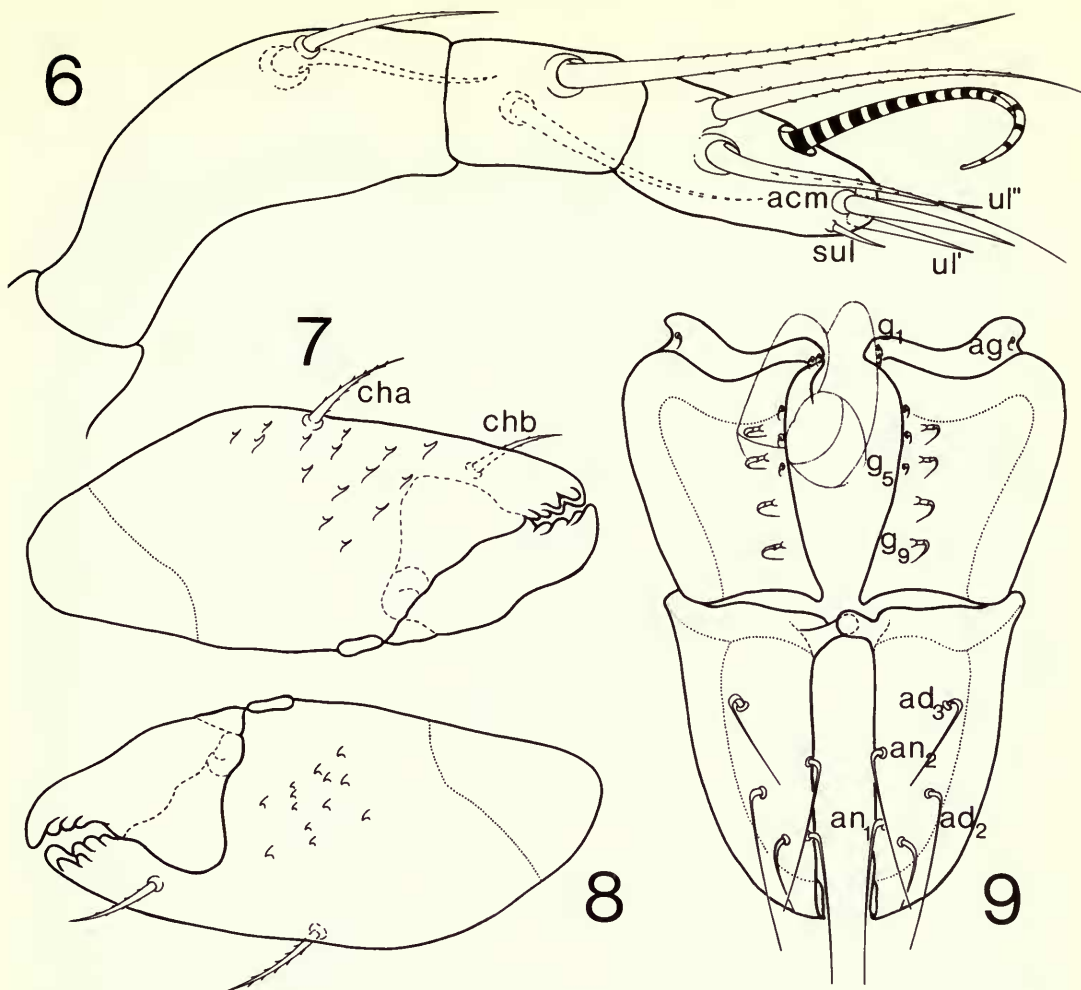
*Aspis* (Figs 2–4; Pl. 1b): 242–282  $\mu\text{m}$  long and with a greatest width of 181–212  $\mu\text{m}$ . All the dorsal setae are rather long, stout and procumbent. The interlamellar setae (*il*) are about 1.5 times the length of the lamellars (*la*) and extend two-thirds of the distance between the bases of the interlamellar and rostral setae (*ro*). The latter almost reach the anterior aspal margin. The sensilli are 40–55  $\mu\text{m}$  long, lanceolate and striated. Three finger-like tracheoles are associated with each bothridium and there is a single pair of short exobothridial setae (*ex*). In front of the *il*–*la* setae there is a pronounced median keel and on each side three lateral keels arranged in an oblique row (Pl. 1b). Of the lateral keels, the paraxial pair is the longest and the antiaxial pair the shortest. The prodorsal integument is not strongly ornamented and appears to be finely punctate as in other *Phthiracarus* species. Behind the sensilli the integument is raised into a number of low longitudinal ridges.

*Notogaster* (Figs 1, 5; Pls 1a; 2d): 464–606  $\mu\text{m}$  in length along a line through  $c_1$ – $h_1$ , and with a greatest depth of 333–484  $\mu\text{m}$ . All the setae are stout, slightly recurved and more or less equal to the distance  $c_1$ – $d_1$  (Pl. 1a). Seta  $c_3$  is inserted on the posterior margin of the collar and setae  $c_{1-2}$  submarginally. Vestigial  $f_1$  is located just below the seta  $h_1$ . The fissures *ip* and *ips* are present. In one paratype *ip* and *ips* were only present on one side. The integument is densely and irregularly papillate (Pl. 2d).

*Ano-genital region* (Fig. 9; Pl. 1f): There are two pairs of comparatively long anal setae ( $an_{1-2}$ ) located marginally and three pairs of adanals ( $ad_{1-3}$ ) forming an oblique row submarginally, the longest in the row being  $ad_2$  which is approximately equal in length to the anal setae. Scanning electron micrographs show that all the setae on the anal plates are weakly serrated. On each genital plate there are nine simple genital setae arranged in two rows. Setae  $g_{1-5}$  are minute and located on the paraxial border while the other four pairs ( $g_{6-9}$ ) are moderately short and submarginal. A single aggenital seta *ag* is located antiaxially in the genital furrow. The integument of the genital and anal plates is weakly papillate (Pl. 1f) with the exception of the areas bearing setae ( $an_{1-2}$ ) where the integument has no distinct ornamentation. There are three pairs of genital papillae, the anterior pair being rather small.



Figs 1-5 *Phthiracarus papillosus*: (1) notogaster, lateral; (2) aspis, dorsal; (3) aspis, lateral; (4) sensillus and bothridium; (5) notogaster, dorsal.



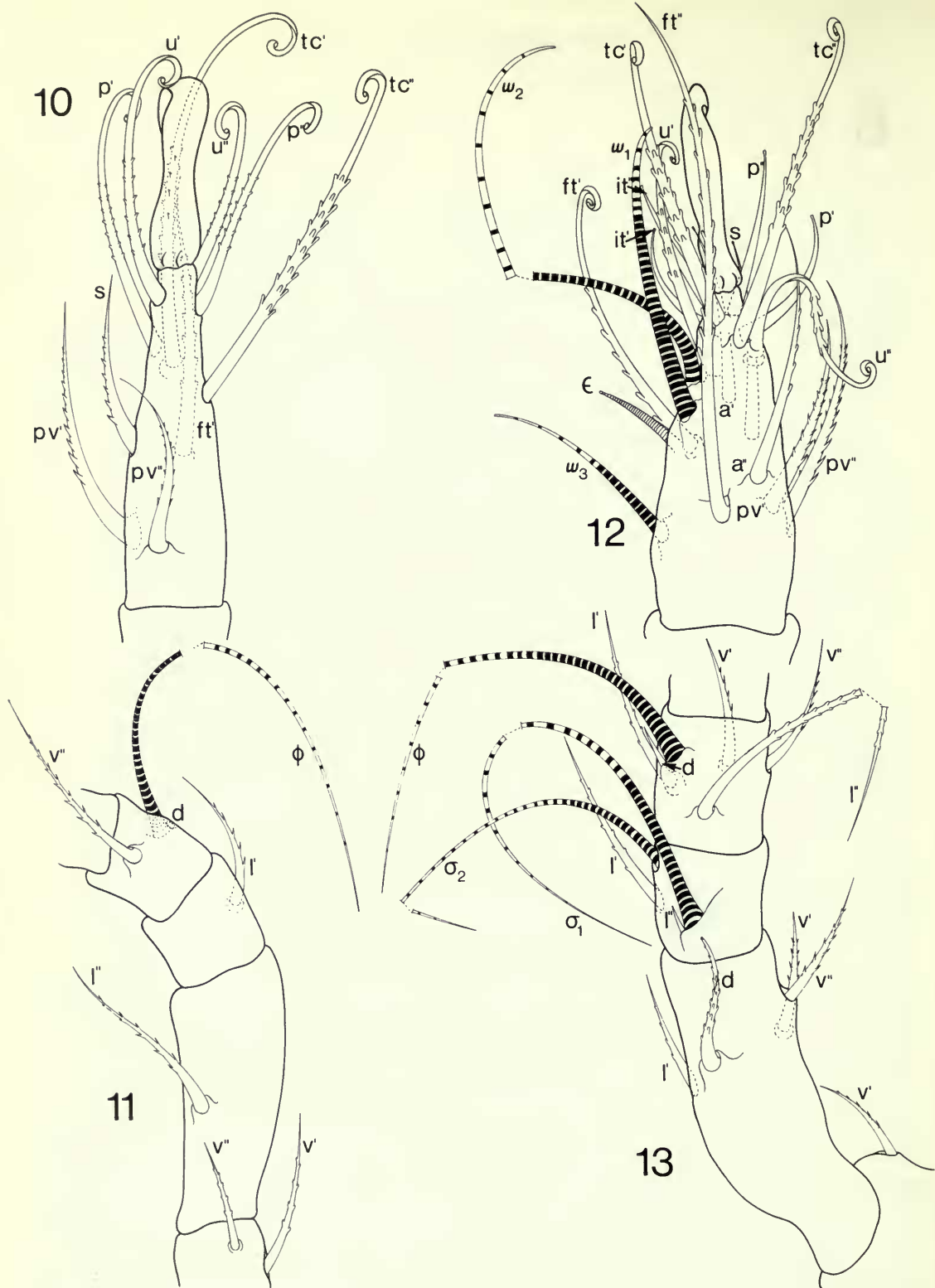
**Figs 6-9** *Phthiracarus papillosus*: (6) pedipalp; (7) chelicera, paraxial; (8) chelicera, antiaxial; (9) ano-genital region.

*Infracapitulum*: This is typically phthiracaroid in form (see for example, Parry, 1979). Of the three pairs of adoral setae, the anterior pair are brush-like distally and the two posterior pairs weakly serrated.

*Pedipalps* (Fig. 6): Three-segmented with the setal formula (2-2-7). Four of the tarsal setae (*acm*, *ul'*, *ul''* and *sul*) are eupathidial, *sul* being rather short.

*Chelicerae* (Figs 7, 8): The movable digit has four teeth and the fixed digit carries five. The latter are arranged in two rows, an outer one of two teeth and an inner row of three. The principal segment carries 12-21 sharply pointed spines on the paraxial surface and 13-26 conical spines antiaxially. Although cheliceral spines have been observed in other species of *Phthiracarus* (see Parry, 1979), the greatest number has always been observed on the paraxial surface. Setae *cha* and *chb* are both serrated, *cha* being somewhat longer than *chb*. The cheliceral integument is finely punctate.

*Legs* (Figs 10-13; Pl. 1c-e): The solenidial formulae for the legs are I (2-1-3); II (1-1-2); III (0-1-1) and IV (0-1-0). On tarsus I solenidion  $\omega_2$  is coupled with a small distal seta. The latter is conical in shape and apparently lacks the longitudinal constriction observed in certain other species of *Phthiracarus* (Parry, 1979) and *Steganacarus* (Parry, 1978). On tibia I the reduced



**Figs 10 & 11** *Phthiracarus papillosus*, posterolateral aspect of leg IV: (10) tarsus; (11) tibia to trochanter.

**Figs 12 & 13** *Phthiracarus papillosus*, posterolateral aspect of leg I: (12) tarsus; (13) tibia to trochanter.

(Figs 10 and 12 are drawn at the same magnification.)

dorsal seta coupled with solenidion  $\phi$  is rather long and prominent (Pl. 1e) but on tibiae II–IV it is much shorter. Solenidion  $\sigma_1$  on genu I is coupled with a small posterolateral seta  $l''$ . The formulae for the leg setae are I (1–4–2–5–16–1); II (1–3–2–3–12–1); III (2–2–1–2–10–1) and IV (2–1–1–2–10–1). On all four tarsi the setal arrangement closely resembles that found in other species of the genus. On tarsus I six of the setae ( $it$ ), ( $p$ ),  $s$  and  $a'$ ) are eupathidial and apparently blunt distally. The famulus  $\varepsilon$  is short, rugose and closely associated with  $\omega_1$ . Seta  $ft'$  is somewhat unusual in being hooked distally (this seta is generally straight on all four tarsi in *Phthiracarus* species). Setae ( $tc$ ) and ( $u$ ) on tarsus I (Pl. 1c) and ( $tc$ ), ( $u$ ), ( $p$ ) and  $s$  on tarsi II–IV are covered with whorls of rather blunt spicules in the middle third. On femur I seta  $d$  is thickened and densely serrated (Pl. 1d), the serrations being blunt distally (in other species of the genus the serrations are fewer and sharply pointed). All the tarsi terminate in a single claw bearing two ventral teeth and an antero- and posterolateral row of serrations.

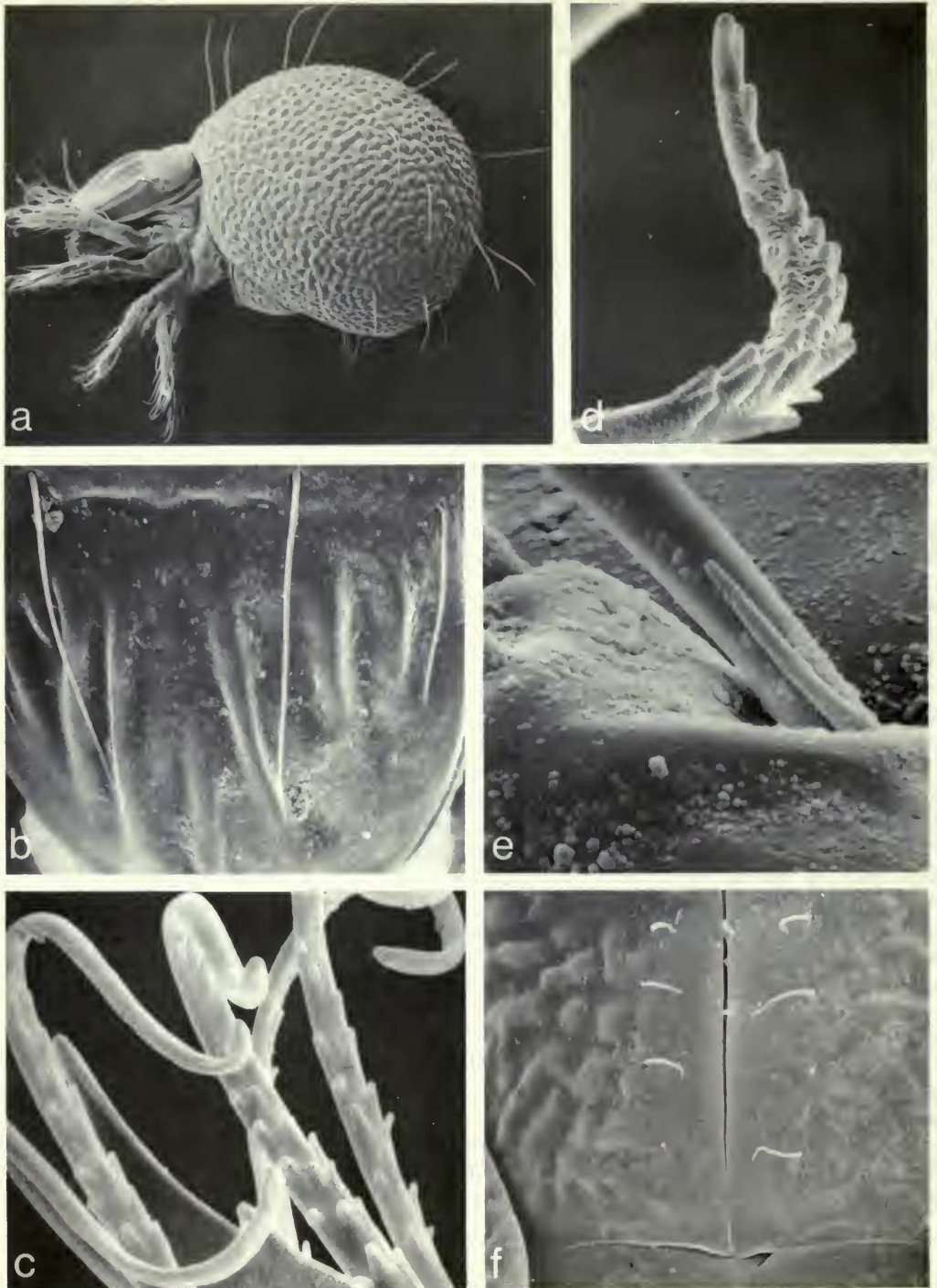
**MATERIAL:** Holotype, BMNH reg. no. 1978.11.10.1, and six paratypes, BMNH reg. no. 1978.11.10.2–7, from oak litter, Leopoldsdorf, Austria. The material was collected by Professor W. Kühnelt, 4 July 1948 and 13 November 1948.

**REMARKS:** In relation to the general shape of the aspis and the integumental ornamentation of the notogaster, *P. papillosus* is atypical of the genus *Phthiracarus*, showing affinities with *Steganacarus* and *Tropacarus*. In these two genera the prodorsal integument posterior to the  $il$ – $la$  setae is raised into a number of longitudinal ridges, while anteriorly there is a median keel and, in certain species, a pair of lateral keels. However, the presence of seven keels in *P. papillosus* is apparently unique in the Phthiracaridae. An ornamented notogastral integument is also present in *Tropacarus* and *Steganacarus*. In the former genus the integument may be described as being irregularly stellato-papillate (Pl. 2a, b) while in *Steganacarus*, although usually punctate (Pl. 2f), a rather striking ornamentation (raised reticulate) has been observed in *Steganacarus clavigerus*, a species described by Berlese (1904) from the Boboli Gardens, Italy (Pl. 2c). In addition, the notogastral setae of *P. papillosus* are rather long and stout as in *Steganacarus* species while the serrated nature of the setae in the ano-genital region is characteristic of both *Steganacarus* and *Tropacarus*.

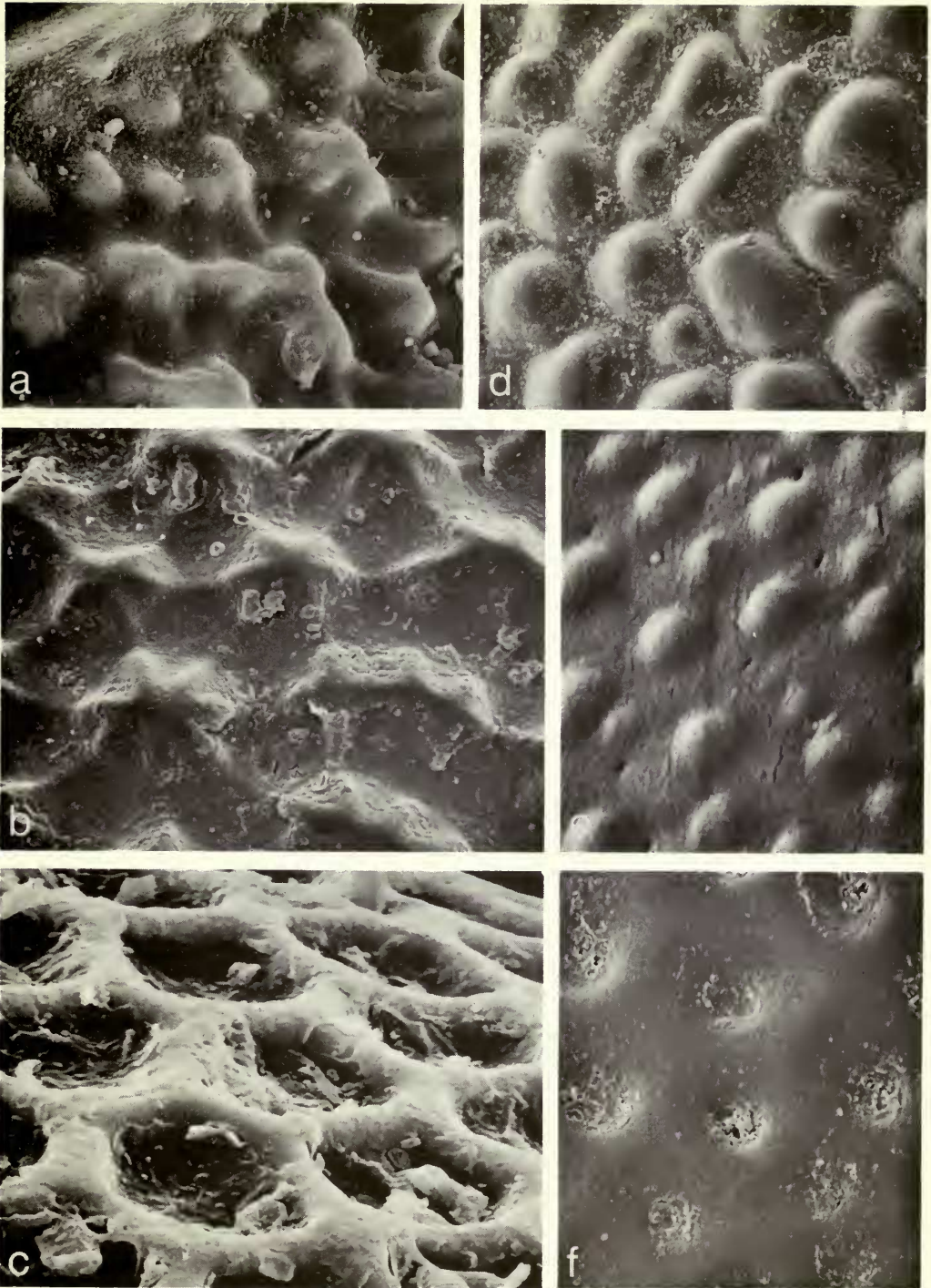
Despite these affinities the Austrian species has been classified in *Phthiracarus*. Procumbent interlamellar setae and a 2+3 setal arrangement on the anal plates are sufficient to distinguish *Phthiracarus* from other phthiracarid genera. However, to accommodate *P. papillosus* in Parry's (1979) definition of the genus, the following modifications must be made: 'The integument of the dorsal and ventral shields is densely punctate and/or papillate while that of the infracapitulum, chelicerae and appendages is punctate.' '... aspis usually without a median keel or lateral keels.' Although the integument of other *Phthiracarus* species appears smooth when seen with the light microscope, scanning electron micrographs have revealed that in a number of British species the integument of the genital plates is weakly papillate and punctate (Pl. 2e).

## References

- Parry, B. W. 1978. A new species of *Steganacarus* (Acari, Cryptostigmata) from Israel. *Bull. Br. Mus. nat. Hist. (Zool.)* 33 (4) : 279–285.
- 1979. A revision of the British species of the genus *Phthiracarus* Perty, 1841 (Cryptostigmata : Euptyetima). *Bull. Br. Mus. nat. Hist. (Zool.)* 35 (5) : 323–363.
- Sheals, J. G. 1969. Computers in acarine taxonomy. *Acarologia* 11 : 376–396.



**Plate 1** *Phthiracarus papillosus*: (a) lateral aspect,  $\times 70$ ; (b) aspis, dorsal aspect,  $\times 400$ ; (c) tectal and unguinal setae on tarsus I,  $\times 3500$ ; (d) dorsal seta on femur I,  $\times 5000$ ; (e) solenidion and associated seta on tibia I, dorsolateral aspect,  $\times 3650$ ; (f) genital plates,  $\times 480$ .



**Plate 2** Integument: notogaster (a–d, f); genital plate (e). (a) *Tropacarus pulcherrimus* (Berlese),  $\times 550$ . (b) *Tropacarus carinatus* (C. L. Koch),  $\times 700$ . (c) *Steganacarus clavigerus* (Berlese),  $\times 1800$ . (d) *Phthiracarus papillosus*,  $\times 1100$ . (e) *Phthiracarus affinis* (Hull),  $\times 8000$ . (f) *Steganacarus magnus* (Nicolet),  $\times 700$ .